* NOTICES *

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3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the subject-copy image data scan approach which can start the subject-copy image data scan approach at the time of reading and compressing image data, especially can raise the compressibility of data using the correlation of an image in the image data compression / elongation processor which performs compression/elongation of digital static-image data.
[0002]
[Description of the Prior Art] There were image data compression / an elongation processor of the JPEG (Joint Photographic Expert Group) method which performs the decryption for coding for carrying out compression transmission of the image data and image elongation as conventional image data compression / elongation processor. The image data compression / elongation processor of a JPEG method are explained using drawing 6 . Drawing 6 is the configuration block Fig. of the image data compression / elongation processor of a JPEG method.
[0003] The image data compression / elongation processor of a JPEG method The encoder 10 which used DCT as the base, and the decryption machine 20 which used DCT as the base, the memory 32 by the side of an encoder 10 (a), and the memory by the side of the decryption machine 20 (b) -- 33 -- memory -- (-- a --) -- 32 -- from -- memory -- (-- b --) -- 33 -- compressed data -- transmitting -- a transmission line -- 34 -- quantization -- the time -- using -- having -- quantization -- a table -- 35 -- coding - a decryption -- the time -- using -- having -- coding -- a table -- 36 -- from -- constituting -- having -- **** .
[0004] Furthermore, in the encoder 10, a DCT operation means 11 to perform a DCT (Discrete Cosine Transform) operation, the quantizer 12 to quantize, and the entropy encoder 13 which performs entropy code modulation are formed.
[0005] Moreover, in the decryption machine 20, the entropy decryption machine 23 which performs an entropy decryption of compressed data, the quantizer 22 which performs reverse quantization, and an IDCT operation means 21 to perform a reverse DCT (IDCT) operation are established.
[0006] In a transmitting side, the actuation in image data compression / elongation processor inputs a subject-copy image, performs a DCT operation with the DCT operation means 11 in an encoder 10, quantizes using the quantization table 35 with a quantizer 12, performs entropy code modulation (here Huffman coding) using the coding table 36 with the entropy encoder 13, and stores a parameter and code data in memory (a) 32. and -- a transmission line -- 34 -- minding -- a transmitting side -- memory -- (-- a --) -- 32 -- from -- a receiving side -- memory -- (-- b --) -- 33 -- a parameter -- code data -- transmitting -- having -- memory -- (-- b --) -- 33 -- storing -- having .
[0007] In a receiving side, a parameter and code data are incorporated in the decryption machine 20. The entropy decryption machine 23 performs an entropy decryption using the coding table 36. A quantizer 22 performs reverse quantization for the decrypted data using the quantization table 35. The IDCT operation means 21 performs a reverse DCT (IDCT) operation, and an image is reproduced (December, 1991 issue p160 written by interface "international-standards coding method of color static image"

Toshiaki Endo - p182 reference).
[0008] Next, the DCT conversion and Huffman coding in the image data compression / elongation processor of the above-mentioned configuration are explained using drawing 7 and drawing 8 . The Huffman coding method is used for the method of entropy code modulation in the image data compression / elongation processor of a JPEG method. Drawing 7 is the explanatory view of DCT conversion, and drawing 8 is the explanatory view of Huffman coding.
[0009] In the DCT operation means 11 of image data compression / elongation processor, the subject-copy image data read per 8x8-pixel block perform a DCT operation, and are changed into DCT translation data. As shown in drawing 7 , the block of subject-copy image data is changed into the array of 8x8 of the difference (AC component) of the average (DC component) of 64 pixels, and the average. In the block shown in drawing 7 , DC component is 260.
[0010] Next, in the entropy encoder 13, it quantizes to the data by which DCT conversion was carried out, and Huffman coding which transposes two or more DCT translation data to a 2-16-bit bit pattern is performed. About DC component, Huffman coding is performed using the value which lengthened this DC component value (B), i.e., A-B, (difference DC value) from last (pre-block) DC component value (A). since a static image generally has the property that it is rare for the average with an adjoining block to change a lot -- difference -- DC value turns into a value near 0. moreover, difference -- compression efficiency is better as DC value is small.
[0011] Next, the conventional subject-copy image data scan approach at the time of incorporating subject-copy image data to the image data compression / elongation processor of the above-mentioned configuration is concretely explained using drawing 9 . Drawing 9 is the configuration block Fig. of the conventional subject-copy image data scan means. The conventional subject-copy image data scan means outputs subject-copy image data to above-mentioned image data compression / elongation processor 4 per 8x8 pixel block, and consists of subject-copy image memory 3 which stores subject-copy image data temporarily, the image input section 2 which reads data from the subject-copy image memory 3, and a control section 1 which directs the sequence (scanning approach) of reading image data into the image input section 2.
[0012] Moreover, a control section 1 has subject-copy image data scan program 1c which specified the scanning approach of subject-copy image data, starts subject-copy image data scan program 1c, and controls the image input section 2.
[0013] Namely, the subject-copy image data read with the scanner etc. are once stored in the subject-copy image memory 3. A control section 1 starts image data scan program 1c, and takes out directions to the image input section 2. The image input section 2 According to the order of the address specified by image data scan program 1c, subject-copy image data are incorporated from the subject-copy image memory 3 to image data compression / elongation processor for every 8x8-pixel block, and the above-mentioned compression processing is performed.
[0014] Here, the outline of the conventional subject-copy image data scan approach specified by image data scan program 1c is explained using drawing 10 . Drawing 10 is the explanatory view showing the conventional subject-copy image data scan approach. As shown in drawing 10 , after reading data from the block at the upper left of a subject-copy image for every block horizontally and completing all readings of the block of eye one train, the conventional subject-copy image data scan approach reads the block of eye two trains from a left end, and reads it horizontally one by one to the block at the lower right of the lowest train similarly.
[0015] Next, it explains that processing of subject-copy image data scan program 1c in the conventional subject-copy image data scan approach flows using drawing 11 and drawing 12 . Drawing 11 is the explanatory view showing the block configuration of the subject-copy image data scanned by the conventional subject-copy image data scan approach, and drawing 12 is the flow chart Fig. showing the flow of processing of subject-copy image data scan program 1c which scans the subject-copy image data of drawing 11 using the conventional subject-copy image data scan approach. In addition, by drawing 11 and drawing 12 , subject-copy image data shall consist of blocks Bi and j (1 <=i<=m, 1 <=j<=n) of a mxn individual, and the block counts m and n are explained as what is set up beforehand.

[0016] The block counts m and n are read first (100), and 1 is substituted for the conventional subject-copy image data scan approach at i (102). Next, 1 is substituted for j (110) and they are Blocks Bi and j. It reads (120), 1 is added to j (122), j is compared with n (124), when j is below n, it returns to processing 120 and reading of a block is repeated. On the other hand, in processing 124, j adds 1 to i, when larger than n (130), and if it returns to processing 110, reading of the next block line is repeated and i becomes large from m when i is below m, the scanning and processing of subject-copy image data will be ended.
[0017]
[Problem(s) to be Solved by the Invention] however, by the above-mentioned conventional image data scan approach As shown in drawing 10 , since the block at the right end of a certain train (e) and the block at the left end of the following train (f) do not adjoin, they do not have a correlation. the difference which lengthened DC value of a block (f) from DC value of a block (e) -- DC value did not turn into a small value, but since the phenomenon in which a correlation is lost appeared whenever the scan of one train moreover finishes, there was a trouble that the compression efficiency of image data will fall.
[0018] In view of the above-mentioned actual condition, it succeeded in this invention, and it relates to the subject-copy image data scan approach which can raise the compression efficiency of image data by reading the block which always adjoined using the correlation of an image.
[0019]
[Means for Solving the Problem] Invention according to claim 1 for solving the trouble of the above-mentioned conventional example is characterized by scanning the block of the subject-copy image data of said storage circles by turns to the hard flow of the specific direction and said specific direction in the subject-copy image data scan approach of scanning said subject-copy image data per block from the storage section in which subject-copy image data were stored, and reading said subject-copy image data.

[0020] Invention according to claim 2 for solving the trouble of the above-mentioned conventional example is characterized by turning the block of the subject-copy image data of said storage circles in the direction of the diagonal line , and scanning right and left focusing on said diagonal line at zigzag in the subject-copy image data scan approach of scanning said subject-copy image data per block from the storage section in which subject-copy image data were stored , and reading said subject-copy image data .
[0021]
[Function] Since it is considering as the subject-copy image data scan approach of scanning the block of the subject-copy image data of storage circles by turns to the specific direction and its hard flow, and reading subject-copy image data per block according to invention according to claim 1 An adjoining block can be read continuously, it is between contiguity blocks, and since the difference of subject-copy image data is small, the compression efficiency in the case of coding in the picture compression process by the JPEG method can be raised.
[0022] Since it is considering as the subject-copy image data scan approach of turning the block of the subject-copy image data of storage circles in the direction of the diagonal line, scanning right and left focusing on the diagonal line at zigzag, and reading subject-copy image data per block according to invention according to claim 2 An adjoining block can be read continuously, it is between contiguity blocks, and since the difference of subject-copy image data is small, the compression efficiency in the case of coding in the picture compression process by the JPEG method can be raised.
[0023]
[Example] It explains referring to a drawing about one example of this invention. Drawing 1 is the configuration block Fig. of the subject-copy image data scan means for realizing the subject-copy image data scan approach concerning one example of this invention. In addition, the same sign is attached and explained about the part which takes the same configuration as drawing 9 .
[0024] As the subject-copy image data scan means of this example is shown in drawing 1 , as the same part as the conventional configuration A control section 1, It consists of the image input section 2 and subject-copy image memory (storage section) 3. Unlike the conventional subject-copy image data scan

program 1c shown in drawing 9 , as a description part of this example, the subject-copy image data scan programs 1a and 1b are the programs to which the scanning and processing shown in drawing 2 or drawing 3 are made to carry out.

[0025] Since each part of the subject-copy image data scan means of this example is the same as that of the conventional subject-copy image data scan means shown in drawing 9 almost, processing by the subject-copy image data scan programs 1a and 1b which are the description parts of this example is carried out to explaining preponderantly, and an intermediary omits explanation into other parts. In addition, 8x8-pixel Grock read in the image input section 2 is incorporated by the image data compression / elongation processor shown in drawing 6 .

[0026] Next, before explaining concretely about the subject-copy image data scan programs 1a and 1b of this example, the outline of the subject-copy image data scan approach of the 1st and 2nd example is explained using drawing 2 and 3. Drawing 2 is the explanatory view showing the subject-copy image data scan approach (the subject-copy image data scan approach of the 1st example) by subject-copy image data scan program 1a, and drawing 3 is the explanatory view showing the subject-copy image data scan approach (the subject-copy image data scan approach of the 2nd example) by subject-copy image data scan program 1b.

[0027] First, without being intermittent in an adjoining block, as shown in drawing 2 and 3, the subject-copy image data scan approach of the 1st and 2nd example reads a 8x8-pixel block in succession altogether, and goes.

[0028] Moreover, although it succeeds in compression/elongation processing with the image data compression / elongation processor shown in drawing 6 , it is necessary to write the image data obtained by the subject-copy image data scan approach of the 1st and 2nd example in the image memory with which the elongated image data also displays per block in the same order as the order of a scan of the 1st and 2nd example. Now, the image before compression and the image of the same configuration can be obtained.

[0029] As shown in drawing 2 , the subject-copy image data scan approach of the 1st example Make 8x8 pixels into 1 block, and the image input means 2 is horizontal per block, scan the image data in the subject-copy image memory 3 to an one direction (the direction of drawing Nakamigi), and subject-copy image data are read. If it finishes reading a horizontal block next, as it is, will move perpendicularly (the direction of drawing Nakashita) by 1 block, and it is horizontal, and will scan to hard flow (left in drawing), and subject-copy image data will be read. Furthermore, if it finishes reading a horizontal block, as it is, it will move perpendicularly (the direction of drawing Nakashita) by 1 block, and it is horizontal, and it will scan to an one direction (the direction of drawing Nakamigi), and subject-copy image data will be read. The processing after this serves as a repeat of the above-mentioned processing.

[0030] if it explains concretely using drawing 11 -- the block (Bi and j) of subject-copy image data -- B -- 1 and 1B -- 1 and 2B -- 1, 3, --, B1 and n If it scans B-2, n, B-2, n-1, --, B-2, and 1 scanning -- further -- B -- 3 and 1B -- 3 and 2B -- 3, 3, --, B3 and n if it scans and the number of the blocks of the last stage is even (m: even number) -- Bm, n, Bm, n-1, --, Bm, and 1 It scans. [next,]

[0031] Since according to the subject-copy image data scan approach of the 1st example it scans so that the block (a) and block (b) with which drawing 2 adjoins may be read continuously for example the difference of DC component which lengthened DC component of a block (b) from DC component of a block (a) at the time of DC Huffman coding -- a value -- a small value -- it can carry out -- therefore, the difference of the DC component, since it can encode with a value The amount of data for compression can be stopped and it is effective in the ability to raise the compression efficiency of the static-image data of a JPEG method.

[0032] In addition, although it is made to perform a horizontal scan to the forward direction and hard flow by turns on the basis of a horizontal scan by the subject-copy image data scan approach of the 1st example, it may be made to scan by turns to the forward direction and hard flow perpendicularly on the basis of a vertical scan.

[0033] As shown in drawing 3 , the subject-copy image data scan approach of the 2nd example makes 8x8 pixels 1 block for the image data in the subject-copy image memory 3, and the image input means 2

reads subject-copy image data in the upper left in drawing focusing on the diagonal line towards the direction of the diagonal line at right and left in a block unit, while [bottom / of drawing Nakamigi / scan / zigzag].
[0034] if it explains concretely using drawing 11 -- the block (Bi and j) of subject-copy image data -- B -- 1 and 1B -- 1, 2, B-2, 1, and B -- 3, 1, B-2, 2, and B -- 1 and 3B -- 1, 4, --, Bm-1, n, Bm, n-1, Bm, and n It scans in order.
[0035] Since according to the subject-copy image data scan approach of the 2nd example it scans so that the block (c) and block (d) with which drawing 3 adjoins may be read continuously for example the difference of DC component which lengthened DC component of a block (d) from DC component of a block (c) at the time of DC Huffman coding -- a value -- a small value -- it can carry out -- therefore, the difference of the DC component, since it can encode with a value The amount of data for compression can be stopped and it is effective in the ability to raise the compression efficiency of the static-image data of a JPEG method.
[0036] Next, the contents of processing of the subject-copy image data scan program which realizes the subject-copy image data scan approach of the 1st and 2nd example are explained. First, it explains that processing of subject-copy image data scan program 1a in the subject-copy image data scan approach of the 1st example flows using drawing 4 and drawing 11 . Drawing 4 is the flow chart Fig. showing the flow of processing of subject-copy image data scan program 1a which scans the subject-copy image data of drawing 11 using the subject-copy image data scan approach of the 1st example. In addition, drawing 4 explains the block counts m and n as usual as what is set up beforehand.
[0037] As shown in drawing 4 , the block counts m and n are read first (200), and 1 is substituted for the subject-copy image data scan approach of the 1st example at i (202). Next, as processing scanned rightward, 1 is substituted for j (210) and they are Blocks Bi and j. It judges whether j is larger than n (224), it reads (220) and 1 is added to j (222), when j is below n, it returns to processing 220 and the scan to the right is repeated, and j adds 1 to i, when larger than n (230).
[0038] And it judges whether i is larger than m (232), i ends the scanning and processing of subject-copy image data, when larger than m, n is substituted for j as processing scanned leftward when i is below m (240), and they are Blocks Bi and j. It reads (250) and 1 is subtracted from j (252). Next, it judges whether j is smaller than 1 (254), and if it returns to processing 250, a leftward scan is repeated and j becomes small from 1 when j is one or more, 1 will be added to i (260). And it judges whether i is larger than m (262), when i is below m, it returns to processing 210 and the right of the next block line is scanned, and i ends the scanning and processing of subject-copy image data, when larger than m.
[0039] Next, it explains that processing of subject-copy image data scan program 1b in the subject-copy image data scan approach of the 2nd example flows using drawing 5 and drawing 11 . Drawing 5 is the flow chart Fig. showing the flow of processing of subject-copy image data scan program 1b which scans the subject-copy image data of drawing 11 using the subject-copy image data scan approach of the 2nd example. In addition, drawing 5 explains the block counts m and n as usual as what is set up beforehand.

[0040] First, the block counts m and n are read (300), 1 is substituted for the subject-copy image data scan approach of the 2nd example at i and j (302), and they are Blocks Bi and j. It reads (304). Next, when 1 is added to j (310), j is compared with n as processing which carries out 1 block scan rightward (312) and j is below n, they are Blocks Bi and j. It reads (314).
[0041] Next, judge whether the value of i is 1 (316), and when i is 1 As processing scanned in the direction of the lower left, add 1 to i, subtract 1 from j (320), compare i with m (322), and when i is below m When j is furthermore compared with 1 (324) and j is one or more, they are Blocks Bi and j. It reads (326), it returns to processing 320, and the scan to the direction of the lower left is repeated.
[0042] In addition, it moves to the processing which subtracts i to 1 since it is the case where a scanning location arrives at [i] the lower limit of subject-copy image data in processing 322 when larger than m, adds 1 to j, returns a scanning (328) location, flies to processing 310, and carries out 1 block scan rightward.
[0043] Moreover, it moves to the processing which subtracts i to 1 since it is the case where a scanning

location arrives at [j] the left end of subject-copy image data in processing 324 when smaller than 1, adds 1 to j, returns a scanning (329) location, flies to processing 340, and carries out 1 block scan to down.

[0044] And in processing 316, when i is not 1 As processing scanned in the direction of the upper right, subtract 1 from i and 1 is added to j (330). When i is compared with 1 (332), j is further compared with n when i is one or more (334), and j is below n, they are Blocks Bi and j. It reads (336), it returns to processing 330, and the scan to the direction of the upper right is repeated.

[0045] In addition, in processing 332, since i is the case where a scanning location reaches the upper limit of subject-copy image data when smaller than 1, it moves to the processing which adds 1 to i, subtracts 1 from j, returns a scanning (338) location, flies to processing 310, and carries out 1 block scan rightward.

[0046] Moreover, in processing 334, since j is the case where a scanning location arrives at the right end of subject-copy image data when larger than n, it moves to the processing which adds 1 to i, subtracts 1 from j, returns a scanning (339) location, flies to processing 340, and carries out 1 block scan to down.

[0047] In processing 312 j and when larger than n Since it is the case where a scanning location arrives at the right end of subject-copy image data, as processing which subtracts 1 from j, returns a scanning (313) location, and then carries out 1 block scan to down 1 is added to i (340), i is compared with m (342), and i ends the scanning and processing of subject-copy image data, when larger than m.

[0048] On the other hand, when i is below m in processing 342, they are Blocks Bi and j. It reads (344) and moves to the processing which flies to processing 330 and is scanned in the direction of the upper right when j is 1, and when j is not 1, it moves to the processing which flies to processing 320 and is scanned in the direction of the lower left.

[0049] the time of DC Huffman coding in a compression process since according to the subject-copy image data scan approach of this example the contiguity block with a correlation is continuously read by the scanning approach shown in drawing 2 and drawing 3 and the JPEG method is made to perform compression processing -- the difference of DC component -- since a value is made to a small value, it is effective in the ability to raise compression efficiency.

[0050]

[Effect of the Invention] Since it is considering as the subject-copy image data scan approach of scanning the block of the subject-copy image data of storage circles by turns to the specific direction and its hard flow, and reading subject-copy image data per block according to invention according to claim 1 An adjoining block can be read continuously and it is effective in the ability to raise [are between contiguity blocks, and] the compression efficiency in the case of coding in the picture compression process by the JPEG method, since the difference of subject-copy image data is small.

[0051] Since it is considering as the subject-copy image data scan approach of turning the block of the subject-copy image data of storage circles in the direction of the diagonal line, scanning right and left focusing on the diagonal line at zigzag, and reading subject-copy image data per block according to invention according to claim 2 An adjoining block can be read continuously and it is effective in the ability to raise [are between contiguity blocks, and] the compression efficiency in the case of coding in the picture compression process by the JPEG method, since the difference of subject-copy image data is small.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the configuration block Fig. of the subject-copy image data scan means concerning one example of this invention.
[Drawing 2] It is the explanatory view showing the subject-copy image data scan approach of the 1st example.
[Drawing 3] It is the explanatory view showing the subject-copy image data scan approach of the 2nd example.
[Drawing 4] It is the flow chart Fig. showing the flow of processing of subject-copy image data scan program 1a which scans the subject-copy image data of drawing 11 using the subject-copy image data scan approach of the 1st example.
[Drawing 5] It is the flow chart Fig. showing the flow of processing of subject-copy image data scan program 1b which scans the subject-copy image data of drawing 11 using the subject-copy image data scan approach of the 2nd example.
[Drawing 6] It is the configuration block Fig. of the image data compression / elongation processor of a JPEG method.
[Drawing 7] It is the explanatory view of DCT conversion.
[Drawing 8] It is the explanatory view of Huffman coding.
[Drawing 9] It is the configuration block Fig. of the conventional subject-copy image data scan means.
[Drawing 10] It is the explanatory view showing the conventional subject-copy image data scan approach.
[Drawing 11] It is the explanatory view showing the block configuration of the subject-copy image data scanned by the conventional subject-copy image data scan approach.
[Drawing 12] It is the flow chart Fig. showing the flow of processing of subject-copy image data scan program 1c which scans the subject-copy image data of drawing 11 using the conventional subject-copy image data scan approach.
[Description of Notations]
1 -- Control section 1a, 1b, 1c -- Subject-copy image data scan program 2 -- Image input section, 3 -- Subject-copy image memory 4 -- Image data compression / elongation processor 10 -- Encoder, 11 -- DCT operation means 12 -- Quantizer 13 -- Entropy encoder, 20 -- Decryption machine 21 -- Reverse DCT operation means 22 -- Quantizer 23 -- Entropy decryption machine 32 -- Memory (a) 33 -- Memory (b) 34 -- Transmission line 35 -- Quantization table 36 -- Coding table

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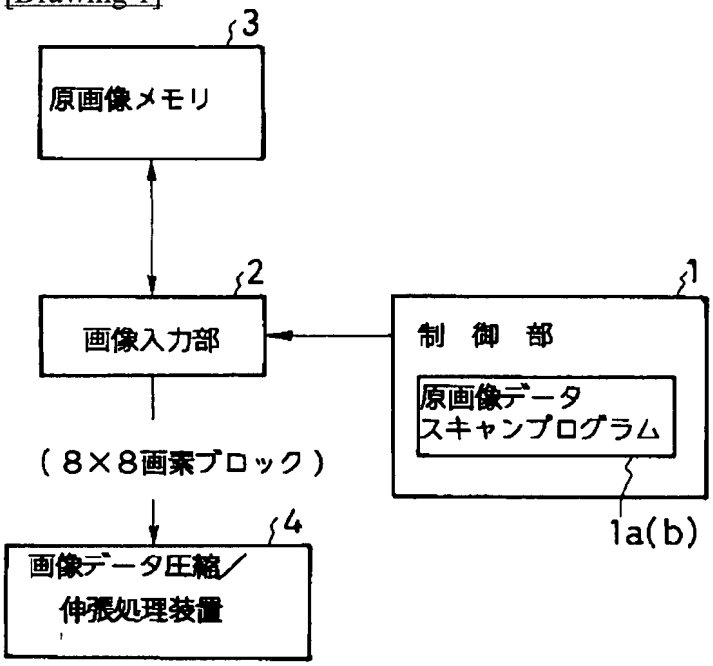
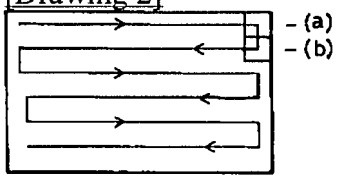
DRAWINGS

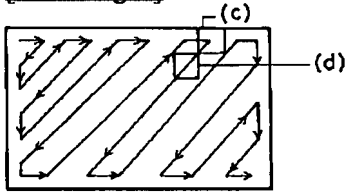
[Drawing 1]



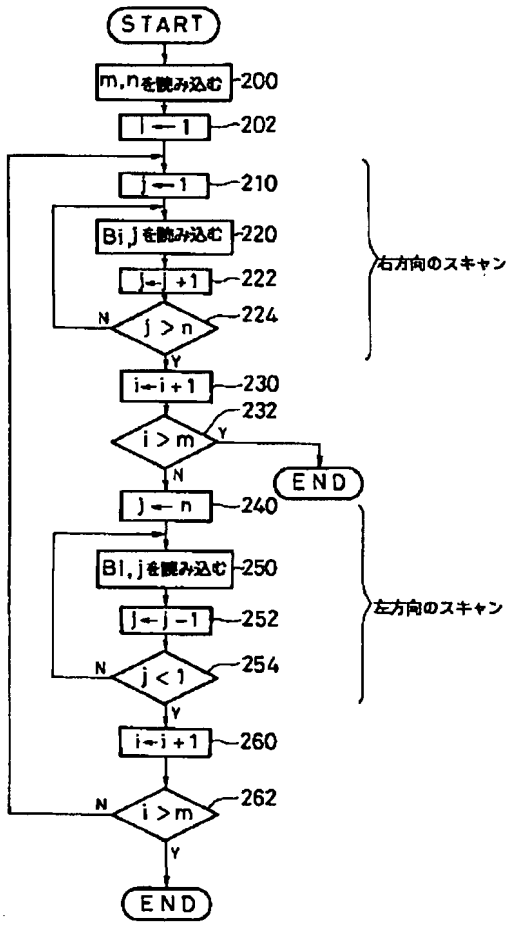
[Drawing 2]



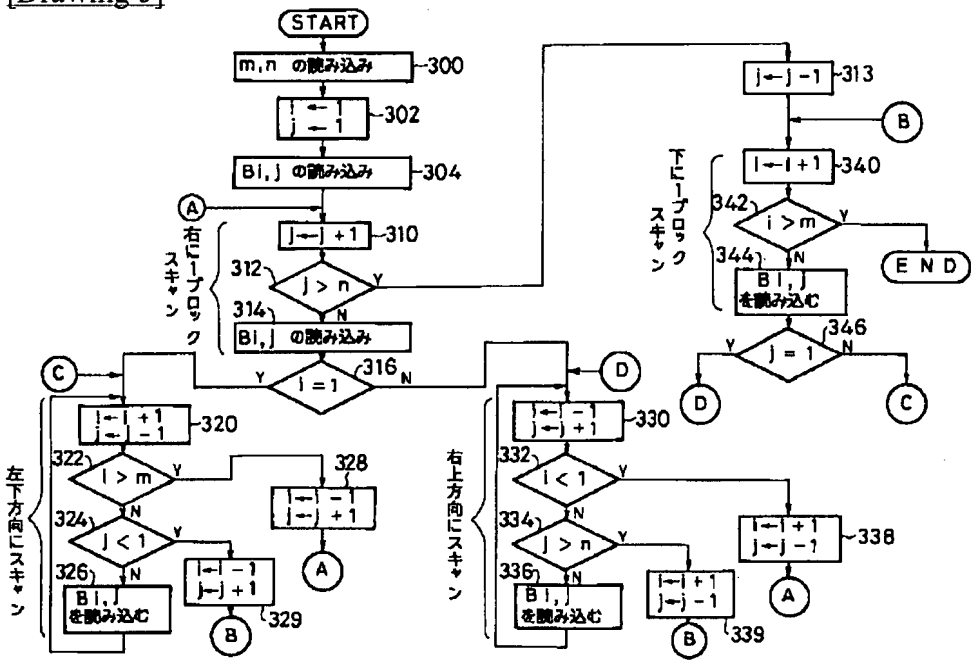
[Drawing 3]



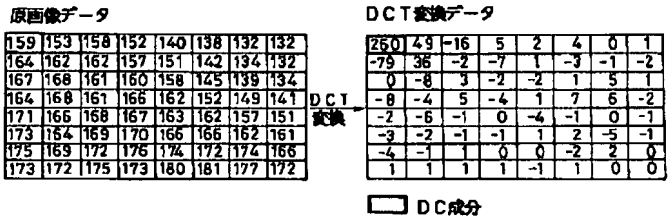
[Drawing 4]



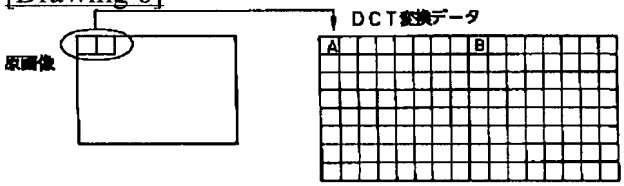
[Drawing 5]



[Drawing 7]



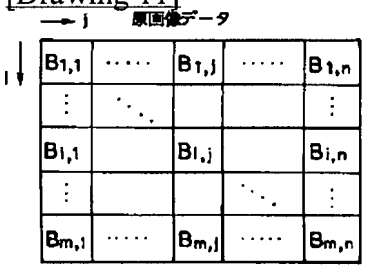
[Drawing 8]



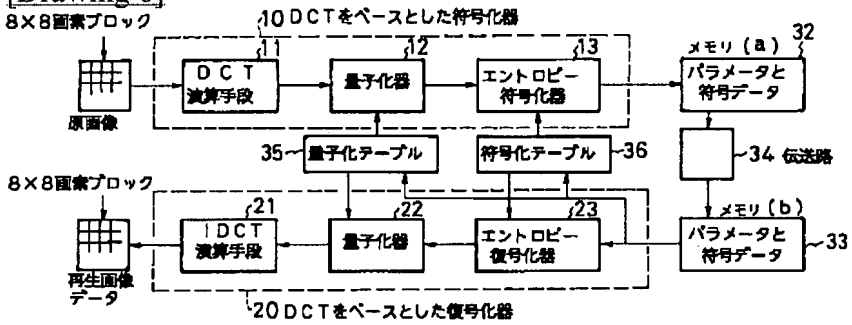
DCハフマン符号化

A(前回DC)−B(今回DC)=符号化時のDC

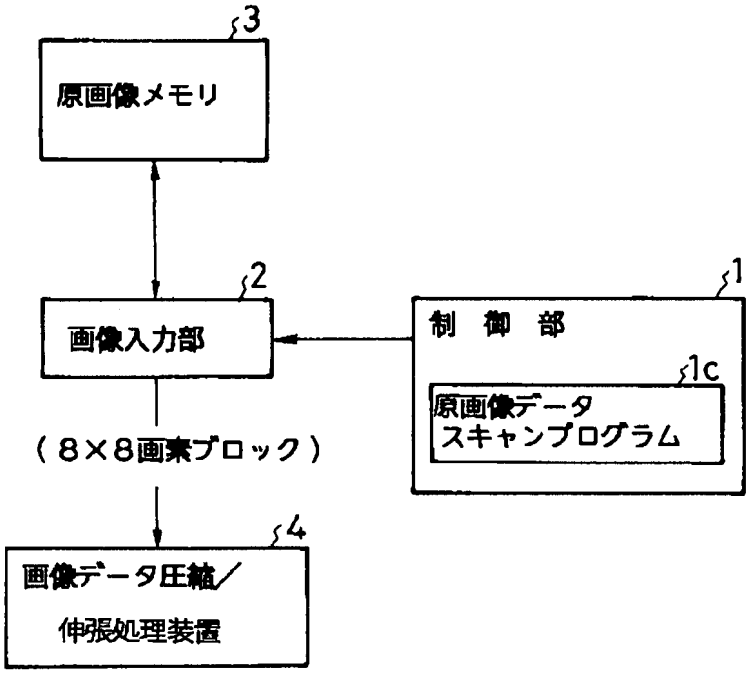
[Drawing 11]



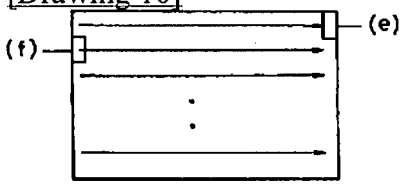
[Drawing 6]



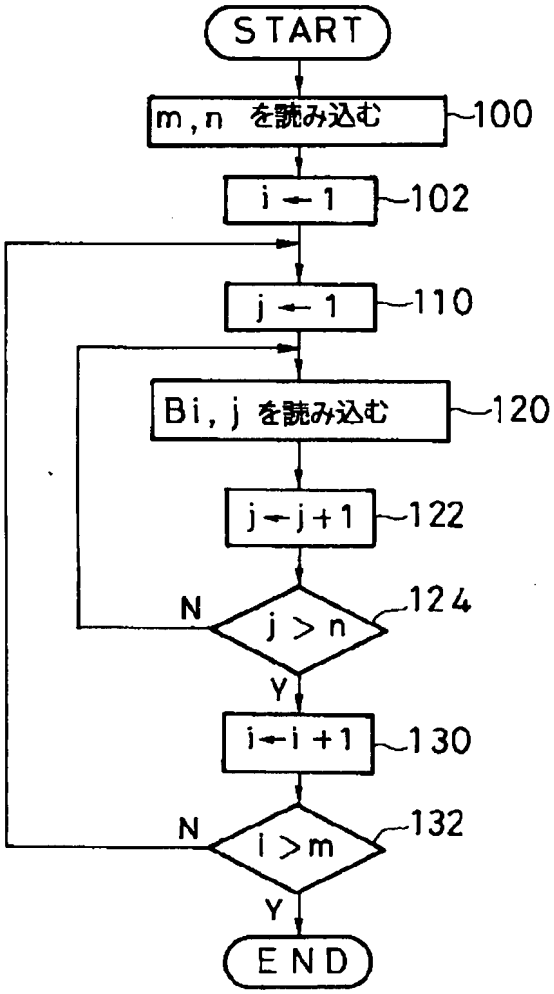
[Drawing 9]



[Drawing 10]



[Drawing 12]



[Translation done.]